

THE FEBRUARY 27th 1952 LUNCHEON MEETING

of the Export Advertising Association
at the Hotel Shelton
New York, N.Y.

THE NEXT TWO BILLION CUSTOMERS

Speaker - Mr. R. Buckminster Fuller, creator of the
Dymaxion house and map and founder of the Fuller
Research Institute.

Mr. R. Buckminster Fuller, with a number of specialists in parallel fields, takes a broad philosophical view of the manner in which man can be fitted into his frames of reference: history and our planet.

In a fascinating talk, he presented our members attending the last meeting with an integrated attempt at carrying out, in capsule form, the scientific adage he likes to quote: "Science is the sincere attempt to set in order the facts of experience."

Mr. Fuller's experience has been wide and varied: attended Harvard College, in 1919-1921 he was Assistant Export Manager of Armour & Company; was National Account Sales Manager of Kelly-Springfield Truck Company to 1927. In 1930 he was Assistant Director of Research of the Pierce Foundation - American Radiator Standard Sanitary Manufacturing Company; from 1938-1940 Technical Editor of "Fortune Magazine" and founder, Director and Chief Engineer of the Dymaxion Corporation, Bridgeport, Connecticut from 1932-35; assistant to the Director of Research and Development at the Phelps Dodge Corporation from 1936-1938, Vice-President and Chief Engineer of the Dymaxion Company in Delaware 1941-2; Chief Mechanical Chairman of the Board and Administrative Engineer of Dymaxion Dwelling Machines since 1944; author of "Nine Chains to the Moon." This is not a complete record but sufficient to say, he is a regular guest lecturer at the leading universities.

"Thank you for that kind introduction! I seemed to have gone very rapidly from one enterprise to another, while other of my classmates and associates of Harvard and Annapolis 1917, stayed pretty steadily in their companies and led pretty satisfactory lives. They often looked askance at me because I seemed to have gone from one company to another so fast. But I'm of a naturally exploring type, I find that I like to tackle problem jobs and "call the shot" and try to round out that job and go on to another. At any rate, there are certain benefits of these kind of experiences. They tend to provide broad hindsight perspective and, therefore, very large patterns of experience. We may then generalize these experiences into patterns of principles of comprehensive nature - principles of simple and complex actions and interactions, pervading all possible experiences, past and probably future. This is to say, that my kind of experience accelerations provided "scientific advantage" for "Science," to quote a great scientist, Eddington, "is simply the sincere attempt to set in order the facts of experience." And, I have become progressively interested in large patterns, the largest kinds of patterns that seem to be available to us out of all the data that we can gather. The larger the patterns and more comprehensive the data, the more general the principles to be derived and the more reliable the forecasting of trends thereby deducible.

In studying large patterns in man's relation to history and to earth, I realized that those who are doing very good tight jobs in important places do not have time to discover that kind of comprehensive data and I sought for ways of presenting the larger patterns of trend factors to men. I made a new method of map projection, taking the data off the globe in a new way and received a patent for it - the first, covering a new method of cartographic projection to be granted by the U.S. Patent Office. That

map was published in "Life" in 1943 and some of you may remember it. It was a colored map showing the thermal latitudes. It was made up of six squares and eight triangles and you could fasten the pieces together and make a kind of globe or you could put the pieces out on the flat and study the earth's whole surface at once with many arrangements and with approximately no visible distortion of the data. It was a very useful map for studying world statistics relative to man.

That map followed another polar stretch-out of the world's surface which I published in "Fortune" Tenth Anniversary Edition, called the "USA Issue," in February 1940. It was titled a "World Energy" map. It showed the approximate location of the world people in terms of one hundred white dots, one dot for each one percent of the human population (each dot represented about 23 million people) and the dot was focused, as accurately as we could mathematically do so, at the center of pressure for that 23 million people. In addition to the white dots on the map which located the live people, there were also one hundred red dots. The one hundred red dots represented 100% of the "energy slave" population of the world. Each red dot represented one percent of the "energy slaves" and each was located at the foci of the respective energy consuming activities. The unit measure comprising an "energy slave," was determined by the foot pound equivalent rate of man's metabolic processing and the rate at which man could convert all his energy receipts into net work and to make the rating conservatively safe, accredited the machinery of industry and technology in general at only 5% efficiency. We found that there were a great many energy slaves now operating for man. Serving our world total of two and one-third billion people, there were thirty-six billion energy slaves in 1940 which world energy slave population leaped to eighty-five billion in 1950.

To give you an idea of the dramatically new relationship of man to his apriori environmental factors brought about by these energy slaves, I point out that only a little over a century before I made this map, the first census of the wealth of the United States was made by the Treasury Department; and in that first census of 1805, there were about a million families in the United States and there were a million live human slaves and no inanimate energy slaves. That is, in 1805, we averaged one live human slave per family. Of course every family did not have a slave. In appraising the wealth of those million American families, and listing all their furnishing, all their clothing, tools, live-stock, and carriages together with their houses and barns, the whole amounted to a total of only \$430 per family. The canals, bridges and toll-ways were lumped at \$15 per family share. The vast undeveloped public lands of the country were obviously of enormous value and they were estimated at \$1,661 per family. But the most valuable single private asset of the U.S.A. average family - their, so to speak, "heavy industry" capital asset, was the human slave. The slave was valued at \$200 per family and all of them were valued at \$200,000,000, which was one-tenth of the total national U.S.A. wealth of two billion dollars in 1805. This slave was so valuable because he or she was a controllable work device, an energy "valve" that you could turn on and off almost at will to get certain tasks done, but such "mechanism" was a poor substitute in every way for our modern power linkage to inanimate, superhumanly precise and quick machinery.

Today, a little over one century later, in the U.S.A. we have a very strange new set of conditions. Life expectancy has doubled and though we no longer have animate slaves, we have an average of 1,600 inanimate energy slaves per family constantly in service to us. During the last decade, our quota of energy slaves has compounded at better than ten percent per annum which is far faster than the cost of living has risen. That is, our costs per unit of total end performance standards has been going down rapidly.

Now, these new kind of inanimate slaves make it possible for us to cover an enormous range of world around operation in ever decreasing minutes per mile. They now provide a world-wide range of personal transport operations in hours and communication in seconds. Our going network of business is now entirely predicated on the energy slave type of super human, physical abilities.

How does our U.S.A. energy slave quota look relative to the world people? I found that this picture was very lop-sided when I made the "Fortune" energy map in 1940. If any of you would like to look at that "World Energy Map," you will also find it reproduced in Professor Karl Zimmerman's "World Resources and Industries" 1951 Revised Edition, and most completely in the magazine "Transformation" of June 1950. It shows that while in North America, we have only 7% of the world's human population, in the total Americas, including Central America and South America, we have approximately 12% of the world's human population. But in North America alone we had 60% of the world's inanimate slaves in 1940 and 73% of them all in 1950. Looking at the rest of the world map, we find that the European population was 25% of world human population in 1940 and 24% in 1950 and had 23% of the inanimate slaves in 1940 and 17% in 1950. There seemed to be an almost balanced growth of human population and world energy slaves in Europe. However, the great imbalance in this country was matched by the enormous imbalance in Asia. That is, we saw that though 50% of the world's population is in Asia, the Asiatic people had only six percent of the world's inanimate slaves in 1940 and only 3% of the world's much enlarged total quota in 1950. The largest aggregate of the red dots outnumbering nearby white dots tended to focus in the western part of the United States on the eastern shores of the Pacific Ocean, and the largest number of white dots, almost unadulterated by red energy dots, on the western shores of the Pacific Ocean. It looked to me in 1940 as though it was pretty clear that the red energy power massing in the western U.S.A. was going to flow westward toward the white massing in Asia. The positive energy potential would go to the negative, that is U.S.A. industrial potential tended to flow naturally to Asia across the Pacific, and would not work toward Europe except in small amounts to maintain Europe's industrial balance.

This was not an easy kind of picture to interpret usefully, in 1940, either to the "Fortune" editorial staff or to business men in general because nobody knew how to give buying power to the people in Asia. But it was quite clear that Asia's enormous number of potential customers of world industrialization soon were going to become real "consumers" of its technology if refused admittance as "customers." And irrespective of how they were going to pay for it, I still felt it was obvious that the next enormous world industrialization phase was going to occur relative to the major mass of white dots in Asia.

We were able to see in other of the large patterns which I studied, that many types of curves indicated fulfillment of these general and specific world industrialization trends. We failed only to see in detail how the curves could be initiated objectively, or would otherwise be subjectively fulfilled. But what is clear, as the years go by, is that the basic world industrialization trend and its component trend to industrialize Asia next which we could find no way to initiate that would be spontaneously and mutually acceptable seems now to be articulating itself. The magnitude of its initial acceleration and the relative efficiency of its "hitting power" performance per units of invested energy are clearly visible, as the Asiatics start flying in jets faster than our own, and do not start in an "elementary" way at the inefficient level of Wright Brothers flying crates.

Many times, people say to me, you didn't count on the war and that curve is being fulfilled because the war came along. I say that the war came along to fulfill the curve because we were not contriving to fulfill the curve in some other way other than war.

This kind of picture that I am giving, isn't any longer novel but it does bring me to a picture which will be novel to you. There's some real surprise in the phenomena of industrialization, and I recognize in it an entirely new set of controlling factors. In industrialization, the most important surprise to all is one which none of the politicians and none of the economists tend to look at - that is, not by virtue of any formal training and custom as it has to do with certain new scientific and technical aspects. For instance, the political viewpoint relative to the world problem I have just given you of imbalances, must be that "here are so many people, and here are so many resources, and when we match the total resources of the amount of iron, amount of copper and so forth, as yet unmined, against physical requirements for upping the standard of living for this large number of have-nots we see that there is not enough tonnage to serve more than 25% of humanity, which, to make it worse, is increasing its numbers at 1% per year."

However, as it happens at the present time, and as the figures on the accompanying chart will show you, (see page 13) there are quite a large number of the human family who are already enjoying the results of the phenomena of industrialization. They are able to step into a telephone booth, put in a few coins and get connected around the world in seconds. They can push a button and have a light go on and its no longer night, more than that, the industrialized families to which I refer average better than one automobile, one electric refrigerator, one radio each, and so forth. And we who live in this picture of people who are industrialized, will be surprised that our percentage of the world population now turns out to have grown very much larger than I think most people would guess. We are aware that there is an enormous velocity of sales, -- deeply aware of it, and we say there seem to be a great many more wealthy people than yesterday, but "how many?" This has been difficult to answer. However, the pattern of "how many" is the kind of pattern that I have been digging into and I am now going to try to disclose it to you.

Up till the year 1900 less than 1% of the human family was able to enjoy the end-products of what is called unlimited, or world resources. As industrialization is predicated on unlimited resources, these world resources are not only comprised of physical elements but also of all intellectual and technical gains of history, as finally objectivised in tools, instruments, tables, formulae, and also the administrative knowledge and laws and also the inventive initiative and the integrating credit, understanding, and going network of all world commerce.

Industrialization is predicated on access to unlimited resources, that is to say, resources of the world rather than local resources. The great change that is taking place in world industrialization is that we are beginning to tap the unlimited energy wealth of the ceaselessly relaying, mutating energy universe, itself.

Plotting the data of our chart, strictly, as of 1900, less than 1% of the human family could be identified as having access to the total technical advantage that was inherent in the integration of the whole history of technology. Therefore, the people who had such access were looked upon as constituting a very distinct minority, sometimes so exceptionally few as to seem, perforce, mystically appointed, and it was historically easy for insurgent politicians to excite the 99% who were have-nots against the few "privileged" men.

After going into World War I, things changed very rapidly. While at the commencement of World War I we, in the U.S.A., had approximately one million autos, only a decade later, we had twenty-five million cars and almost attained Hoover's two for every garage. The U.S.A. type of family was clearly beginning to have free access to the high technical advantages of world industrialization. Now looking at the lot of "world" man we note that as we entered World War I, 6% of the human family could be identified (in integrated energy conversion measurements) as having personal access to the network of the ever higher technical advantages of industrialization. This was a brand-new phenomenon in all history. It constituted a visibly growing percentage of "privileged" people clearly expanded for the first time beyond the all previous historical precedent of less than one percent of "privileged." These figures were not easy to put together because it takes digging and study to verify and comprehend the data and the principles involved. It is difficult to convince the world majority of "have-nots" that this multiplying number is anything other than the same small number of historically privileged people just grown a little bit more lavish with the new era products.

At the end of World War II, however, the percentage of the human family having access to the total advantages of industrialization was grown to 20%. At the present moment, the figure is 28%. I would like to make a quick chart of this (draws figures shown on chart, page 13).

It shows that as already related in 1900 the "privileged" were less than 1%; in 1917 6%; in 1940 20%; 1948 25%. This interesting curve is also substantiated by another curve that I have been studying.

In 1936, the American population had 140 pounds of copper per capita in use by them in their domestic pattern of industrialization and world man had only 14 pounds. The amount of copper per capita in the United States, however, was going down, not because we were being unwittingly de-industrialized, but because we were rapidly increasing the performance per pound of the copper per each of its functional tasks and the excess increments were going into export. The Bell laboratories said in 1936 that the telephone system then serving but 20% of humanity, could go to full 100% world industrialization without the system's buying another pound of copper, because they were learning by scientific research; how to continually "up" the numbers of telephone conversations per unit cross-section of copper wire. In fact, they began to release large tonnages of copper to other uses while upping their own standards of performance. This world copper study gave rise to a working hypothesis which I adopted in 1936, that at 2000 A.D. we would approach full world industrialization. Studies of the decreasing copper per capita in U.S.A. from 140 pounds and increasing world man's copper per capita from both new mined ore and recirculating copper scrap, showed that the two curves came to the same level of 100 pounds per capita for all world people in 2000 A.D.

We can see that to peoples unfortified by the scientific enlightenment which our chart provides, the communist or fascist politicians can easily warp the picture to urge that the time has come to liquidate the improperly privileged minority, still supposedly the less than 1% of world population, in favor of a world socialism. The biggest news of all that is contained in this chart (see page 13), is in what I call the "critical point," for it shows that we do not have to wait till 2000 A.D. and for 100% industrialization in order to have a natural world equilibrium which will be truly peaceful, because when we go through the 50% point, the majority of world people will for the first time be "haves." We find that we are to go through the 50% point in 1972, and the curve could be accelerated.

When the majority are "haves," then everybody will realize that their physical success is in terms of man as consumer instead of man as a producer; (because very rapidly in a technical sense, we are transferring from man as a muscle machine to man as a prototyping and reorganizing, redesigning initiator.) So we see that physically speaking, man is essentially a "consumer." Having passed beyond that 50% industrialization point, it will not be a task to talk to world man about his being accelerated into an ever higher standard of living by integrated individual initiative. It will be, however, impossible to ever again promote socialism which presupposes fundamental Malthusian "scarcity" and assumes solution of scarcity only by progressive austerity for all.

It will be an extremely critical task, however, between now and 1972. As we approach the 50% point, the have-nots and the politicians are going to say that things are getting worse and worse. The successful passage of this next twenty years is one requiring a new kind of foreign policy. In the first place, we must recognize that we have as yet no U.S.A. foreign policy, and in fact, never have had one.

Foreign policy means world policy and world policy was made for the last five hundred years by international banking, headquartered, for most part in the United Kingdom, while the 40 billion of bullion gold was enough to cover the size of the productivity of our pre-industrialization's agricultural economics and its world commerce requirements. Fundamentally, the wealth increments of the older economics came from agricultural productivity, the kind of energy wealth that we could almost ignorantly take advantage of.

In 1917 the old world banking management went out and in 1927-29 the world went off that gold standard because total bullion was neither large enough nor functional enough to cover or instrument the multi-hundred billion magnitudes of industrialization. The old management did not send out any farewell notices and all the world including and especially, the U.S.A., pre-occupied with breathtaking domestic acceleration, thought that somebody was working out the big world pattern, as usual, and not until today have we awakened to the fact that we do not have any positive comprehensive, long distance foreign policy but only fortuitous defensive improvisations waiting upon formulation of a policy of responsibility.

World policy can only be made by one country at a time and that country which can make it is ipso facto the world creditor nation and world energy value master. As Churchill said in a post World War II speech, "the U.S.A. is now on top of the heap," and do it well or do it poorly, whatever the U.S.A. now calls out, signals the evolving world policy.

U.S.A. man in his new initiative responsibility and enterprise is going to have to discover what are the requirements of that enterprise which will most quickly bring the highest standard of living to all men - albeit the responsibility was not asked for any more than in acquisition of any maturing human function. There's nobody to evolve this world policy for us. We are going to have to make it ourselves.

I can say something that is very important to you here. The politicians, going on what the economist tells them, say to you that there are not enough resource, nor ever will be, to take care of the 100% and because there is fundamental scarcity, there must be fundamental war "for the bone." However, the modern technologist can tell you that there is plenty of tonnage to take care of full world industrialization. That too is part of the news I bring to you.

When I had my first automobile to drive in 1908, my automobile's tires were each only good for 1,000 miles. When we came out of World War I, I was amazed to be able to buy a "3,000 miles guaranteed" tire. In 1922 there were 5,000 mile tires. When I bought my 35th car last October, it had 30,000 mile tires on it. I was sore because if I had only waited a month, I could have had 50,000 mile tires. The 50,000 mile tires don't weigh a pound more, in fact they even weigh a little less than the 1908 1,000 mile tires. Not only do they weigh less but they also will go four times as "safely" fast as those 1908 one-thousand milers. The safe speed performance is four-fold which gives me 4 x 30 which is 120 times the performance per pound of auto tire between 1908 and 1952 and in order to arrive at 100% world industrialization, all that we need do is to increase our world industrial tonnage's performance by four times and fortunately, we know that our present overall mechanical efficiency is extraordinarily low. For instance, we can take every automobile systematically off the road and replacing each we can now produce two to three cars, much better made, out of the same poundage of metals and plastics now contained in one car. I am not saying that this is easy - far from it - it is the greatest challenge to ingenuity, hard cerebral work, and patience that has ever come to man. All this positive offensive must be taken while waging a negative defense action - internally and externally, on ten thousand mile fronts, and at long and short ranges, to prevent outright conflagration and possible man chaos. I am also saying that it is now technically and scientifically visible that it is both a possible and probable task; and it is also visible that the kind of factors with which I deal so glibly, are the kind of factors out of which the solution must come.

It is clear that from the scientific and technical viewpoint, it is quite possible to consider reworking the total resources now involved in the industrial equation and by introducing new techniques and increasing efficiency to up the performance of the total world inventory four-fold. This is what we will have to do in order to effect one hundred percent world industrialization. To understand how feasible this reworking at higher performance per pound will be, it is also necessary to understand something that is not popularly known about our resources themselves.

In the year 1917, man took from the ground more copper in that one year than he had mined accumulatively in all history. This represented a new magnitude of uprooting of world resources that resulted from unleashing the scientific potential accredited by the American people in 1917. Since that time, the magnitude of resources taken from its original random disposition over the face of the earth, has been of the same high order. Some see coming exhaustion of the original resources. This is not ominous. It is not ominous because man continually reworks the inventory already mined and processed chemical elements. This is to say that only 14% of all the copper mined in history has been lost and that, only temporarily, because we know where most of it is -- in ships, in high concentrate upon the ocean floor. We will soon be recovering that 14% and better than 99% will continue to recirculate in a succession of technical functions.

Copper first served the maritime industry and thus helped to start industrialization itself. It was used because of its non-oxidizing quality on the seas. When man learned to paint iron, the copper components were withdrawn and substituted for by leadpainted iron. Copper went on to serve successively the inception of railroading. When railroading was well under way, the copper was withdrawn again and went on to set up the electrical generating and distributing industry from which it now tends to be withdrawn to carry on other functions. The total fund of world copper goods recirculate every $22\frac{1}{2}$ years. The same kind of cycle characterizes iron. The same kind of recycling in various unique periods characterize all industrial elements. Elements do not disappear from the universe except by radioactivity. We can indeed

say that our major world resource of the chemical elements is above ground and recycling. The amount taken from the ground annually is only required to match the annual increase in world population. What is above ground and is recycling will be accelerated by new design and concomittant obsolescence of the old and less efficient use or resulting from the increased research in the improvement of performance per pound until it is soon stretched to take care of the 100% of the world's population.

I discovered this recycling phenomenon in 1936 when working for Phelps Dodge Research Department. As the copper recycling came on the $22\frac{1}{2}$ year basis, it meant that the scrap coming into the market in 1936 was that of 1913 or just before World War One, which was a very low magnitude. All scrap coming into the market at that time had been this low. I was then able to make a prediction which would prove my point regarding recycling in a dramatic way. Because more copper had been mined in 1917 than in all history before, I was able to predict that in 1939 more scrap would be on the copper market than man had ever seen before and from that year on would appear in very much larger quantities. This came true.

By the same token, I can now tell you that our shortage of metals at the present moment can be explained by looking back $22\frac{1}{2}$ years and we will find ourselves in the midst of the 1929-32 depression when mining had almost ceased temporarily. If shortages are suddenly vanishing, which is our recent news, it is because we are getting to the end of that depression recycling.

I have said to you that you are going to have to work out foreign policy as representatives of industrialization in the United States. It is not a function of government to evolve foreign policies, it is their function to formulate methods which will serve your ends in the expansion of industrialization in a responsible manner to the rest of the human family. The kind of factors I have been discussing are the kind of factors out of which you will have to evolve that foreign policy and it can be done without the negative of throwing the resources at the world people through cannons. If we wonder about how we are going to get the purchasing power to the 75% "have-nots," we can say we also wondered how we were going to get armaments to our allies who had no money to pay for them. We learned how to lend-lease out and we did not go broke in the process. We are richer today than ever before in all history. We will have to learn how to lend-lease purchasing power to world man to acquire our peace-time goods and make it pay off. That this can be done is clearly possible and if it is done, we will be synchronizing with the unavoidable curves instead of battling them all the way.

Our present accrediting of European armament purchases is a small percentage of credit for complimentary civilian needs. This is the kernel which you will have to learn to cultivate.

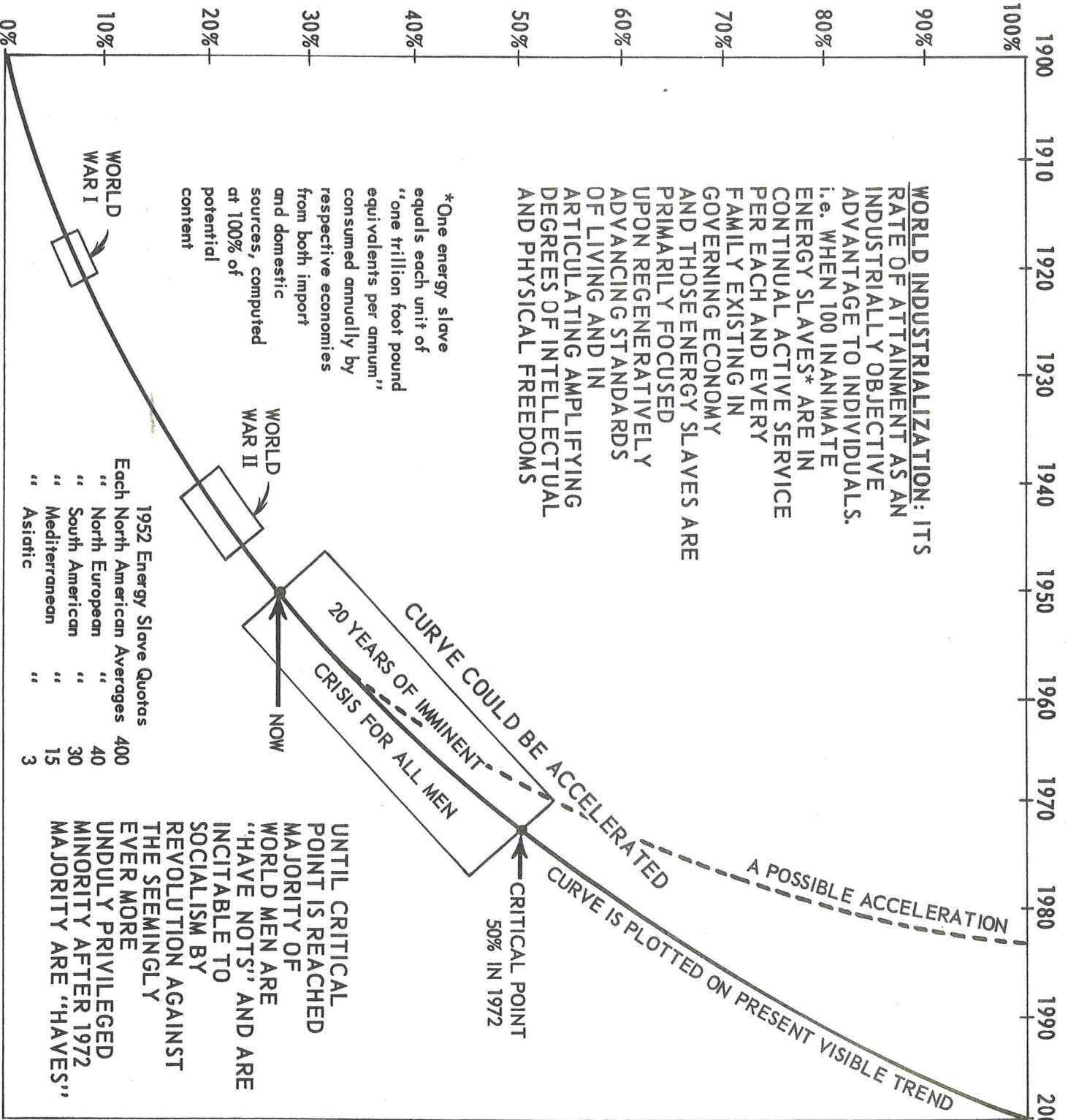
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The guests at the head table of the luncheon introduced by the President were: Richard C. Thompson, Export Manager of Electric Auto-Lite Company and William Beard, President of the Associated Business Publications.

EST. AT 2,300,000,000 IN 1940 AND INCREASING AT RATES OF 1% PER YEAR THUS APPROACHING 3,000,000,000 BY 2000 A. D.

WORLD POPULATION

THE TWENTIETH CENTURY



"SLAVES" NOW USED IN NO. AMERICA AT 4% EFFICIENCY
FUNCTION OF NO. AMERICA: TO UP EFFICIENCY AND EXPORT SWELLING SURPLUS